

PATENT SPECIFICATION



Application Date: Nov. 7, 1919. No. 27,581 / 19. **159,927**

Complete Left: Sept. 6, 1920.

Complete Accepted: Mar. 7, 1921.

PROVISIONAL SPECIFICATION.

Improvements in Apparatus for Manceuvring Ships and Aircraft.

I, EDMUND SCOTT GUSTAVE REES, Managing Director of The Rees Roturbo Manufacturing Company Limited, in Wednesfield Road, Wolverhampton, in 5 the County of Stafford, do hereby declare the nature of this invention to be as follows:—

This invention relates to apparatus of the kind which is described in Patent Specification No. 124,047 as applied to ships driven by screw propellers, and in Patent Specification No. 2664 of 1919 as applied to aircraft and to ships propelled on the water by means of air propellers, 15 and it consists of an improved form and construction of manoeuvring duct and pallets applicable to all these classes of craft.

According to the invention the 20 manoeuvring tube is made with the rear part of square or oblong section and the pallets which form part of the side walls, or it may be the upper and lower walls, of this part of the tube are pivoted at 25 an intermediate point for balancing purposes, and have forwardly projecting wings of suitable size and shape which, when the rear edges of the pallets are closed on each other form in conjunction 30 with the walls of the tube forwardly

directed outlets or nozzles. The fixed part of these outlets or nozzles is preferably formed so as to direct the issuing fluid streams forwards parallel to the axis of the manoeuvring tube. 35

In one construction the forward end of the tube is circular and of a diameter substantially the same as that of the propeller, merging into a rear square portion of a width and depth equal to this 40 diameter, the expansion which produces the requisite drop of pressure in rear of the propeller being provided by the corner spaces of the tube. Or the rear part of the tube may be greater in width 45 or depth or both than the diameter of the circular inlet end. The forward or circular part of the tube or duct may itself expand slightly rearwards from the inlet opening, the degree of expansion 50 increasing at the connecting fillets where it merges into the square end portion. Further, the circular portion may have a flaring inlet.

Dated this 7th day of November, 1919. 55

ABEL & IMRAY,
Agents for the Applicant,
30, Southampton Buildings, London,
W.C. 2.

COMPLETE SPECIFICATION.

Improvements in Apparatus for Manceuvring Ships and Aircraft.

I, EDMUND SCOTT GUSTAVE REES, Managing Director of The Rees Roturbo Manufacturing Company Limited, in 60 the County of Stafford, do hereby declare the nature of this invention and in what 65

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manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to apparatus of the kind which is described in Patent Specification No. 124,047 as applied to ships driven by screw propellers and in Patent Specification No. 141,445 as applied to aircraft and to ships propelled on the water by means of air propellers, and it consists in certain improvements applicable to all these classes of craft in the construction of the manœuvring duct and control pallets.

According to the present invention the open ended longitudinal duct immediately or mainly in rear of each propeller is given the rearward expansion necessary for its efficient action as an augmenter, while at the same time facilitating the fitting and operation of the pivoted vanes or pallets which control the rear opening of the duct and in association therewith provide means for manœuvring the vessel in the manner described in the aforesaid specifications, by making the sternward portion of the duct of square or oblong cross section, while the front portion is of circular section merging either directly into the square or into an intermediate part of oval section which in turn merges into an oblong sternward portion. Also, the forward portions of the pallets are so shaped and dimensioned that in the full speed ahead position they close on the outer surface of the walls of the fixed duct or tube of which they form a continuation, and when the rear edges of the pallets are closed centrally on each other their forward ends and the cooperating parts of the augmenter walls constitute nozzles which direct the flume from the propeller forwards substantially parallel with the axis of the tube and centre line of the ship.

These and other features of the invention will be more particularly described with reference to the accompanying drawings, wherein Fig. 1 is a central longitudinal section of the stern of a ship fitted with augmenter tube and manœuvring pallets constructed and operating in accordance with the invention; Fig. 2 is a part sectional plan view of same; Fig. 3 a transverse section of the augmenter tube on line 3—3 of Fig. 1; Figs. 4 and 5 horizontal longitudinal sections of the tube and pallets shewing the latter in the positions for going astern to starboard and to port respectively; Fig. 6 is a longitudinal elevation of a modified construction of augmenter

tube shewn in association with an air propeller; Figs. 7 and 7^a are plan views of same shewing the pallets in alternative positions; and Fig. 8 is an end elevation.

It will be understood that when the invention is applied to air craft the manœuvring tubes may be arranged with the axes of the manœuvring pallets horizontal instead of vertical as shewn, while in the case of submarines they would be so arranged when the apparatus is used to effect submersion or emersion of the vessel.

Referring first to Figs. 1—5, the augmenter tube *a* which is rigidly fixed below the counter of the vessel in substantially axial alignment with the propeller *b* has a forward or entrance portion of circular cross section of a dimension just sufficient to encircle the propeller blades with only a small clearance. This merges into a sternward or tail portion which is square in cross section the top and bottom plates of which are rigid with the remainder of the tube and furnish pivot posts *c* for the pallets *d*, *e* which, in the open position shewn in dotted lines in Fig. 2, constitute the rear portions of the side walls of the square. External to the plane of each side wall and rigid with the tube are two forwardly directed nozzles or ducts *f*, which may be regarded as being obtained by offsetting a vertical strip on each side of the square portion of the tube so as to increase the width thereof locally. When the rear edges of the pallets *d*, *e* are closed in the central position shewn in full lines in Fig. 2 their forward edges are closely adjacent to the rear edges of the offset strips forming the nozzles *f*, so that the flume from the propeller is then deflected to either side and forwardly by the pallets and is discharged from the augmenter tube through the nozzles *f* forwards parallel with the axis of the tube and the centre line of the ship, or substantially so. The area of the nozzles is designed to give the fullest possible conversion of the potential energy of the water within the augmenter tube into speed energy.

The pivots of the pallets are carried by inwardly projecting brackets *d*¹, *e*¹ which bring the pivot axes considerably inside the planes of the side walls of the augmenter tube. There are certain advantages resulting from this disposition of the pivot axes as compared with pivots in the planes of the pallets which will be referred to later.

The pallets may be operated by any suitable gear whereby they may be swung

simultaneously or separately in the same or opposite senses. The gear herein-after described comprises part of the subject matter of a copending Application No. 14,277/20 and no claim is herein made to such gear.

The steering or manœuvring pillars *g* by which the pallets *d e* are manipulated are carried up through the counter of the ship and have arms *g¹* rigidly attached to them and sector arms *h* connected with them through yielding clutch member *h¹* of such character that when the two sector arms are turned continuously in the same sense by the operating gear, the gear can be continued to be turned in that direction after either of the pallets has reached its limiting position, as shewn in dotted lines in Fig. 2. The pallets are urged towards the open or dotted line position by means of a tension spring *g²* which is connected by suitable flexible connections with the ends of the arms *g¹*.

25 The rear edges of the pallets may be curved outwardly as described in the aforesaid co-pending application so as to remain in contact with each other over a considerable period of angular movement when they are swung in the closed position either to port or to starboard, and to assist in the relative sliding movement involved in such motion the inner curved surface of the tips of the pallets 30 may be continued in the form of webs *i* adapted to continue in engagement with the inner face of the opposing pallet throughout the range of the swinging movement of the pallets, or substantially 40 so.

The sector arms *h* by means of which the pallets are operated, may be actuated as shown, by means of drums *j*, each having its own steering wheel *j¹*, and flexible cords *k* which wind around the respective drums and are led around suitable guides and connected with the inner ends of the sector arms. The drums *j* are normally coupled by means of a clutch 45 which may be of the ordinary dog type so that both pallets are actuated simultaneously by rotation of either steering wheel *j¹*, but the drums can be declutched one from the other against the action of a return spring by outward axial movement of one of them, in which case the two steering wheels are separately usable for turning the pallets in either direction. Thus, the extent of the separation 50 of the rear tips of the pallets which is required is effected by the separate operation of one or both of the steering wheels, and any subsequent joint movement of

the pallets in the same sense for steering purposes is effected by the steering wheels in their clutched position.

Referring now to Figs. 6—8, apart from the fact that the construction in these figures is shewn in association with an air propeller *b¹* in rear of which within the augmenter tube *a* there may be provided a stream line body *l* of such dimensions and shape as will give any required rate of expansion of the passage inside the augmenter tube, the principal differences between this construction and that already described consist in the steering pillars *g* and the pallets *d, e* lying in the planes of the pallets themselves, which necessitates the webs *i* which continue the curve of the inward surfaces of the rear tips of the pallets, being of considerably greater depth in order to maintain contact between the web and its opposing pallet over any considerable range of lateral swing of the pallets, and in the transition from the circular entrance of the augmenter tube *a* to the oblong rear portion there is interposed between the two an intermediate elliptical section. Further, the circular front portion itself expands slightly from front to rear of its length.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. In ships and other propeller-driven craft, in association with the propeller or propellers a manœuvring duct or tube having its rear end of rectangular section and pivoted pallets or vanes mounted thereon and controlling the rear opening, substantially as described. 100
2. In ships and other propeller driven craft, in association with the propeller or with each propeller an augmenter tube of circular section at its forward end merging into a tube of rectangular section of greater area at its rear end. 105
3. In ships and other propeller driven craft, in association with the propeller or propellers an augmenter tube of circular section at its forward end and oblong section at its rear end connected by an intermediate portion of substantially oval or elliptical section. 115
4. In augmenter tubes as claimed in the preceding claims, a forward circular portion of increasing cross section from front to rear. 120
5. In ships and other propeller driven craft, a fixed tubular duct and pivoted plates or pallets, constructed and rela- 125

tively arranged so that when the rear edges of the pallets are closed centrally on each other, the forward ends of the pallets and cooperating parts of the 5 augmenter walls constitute nozzles directed forwards substantially parallel with the axis of the augmenter tube.

6. In ships and other propeller driven craft, an augmenter tube constructed as

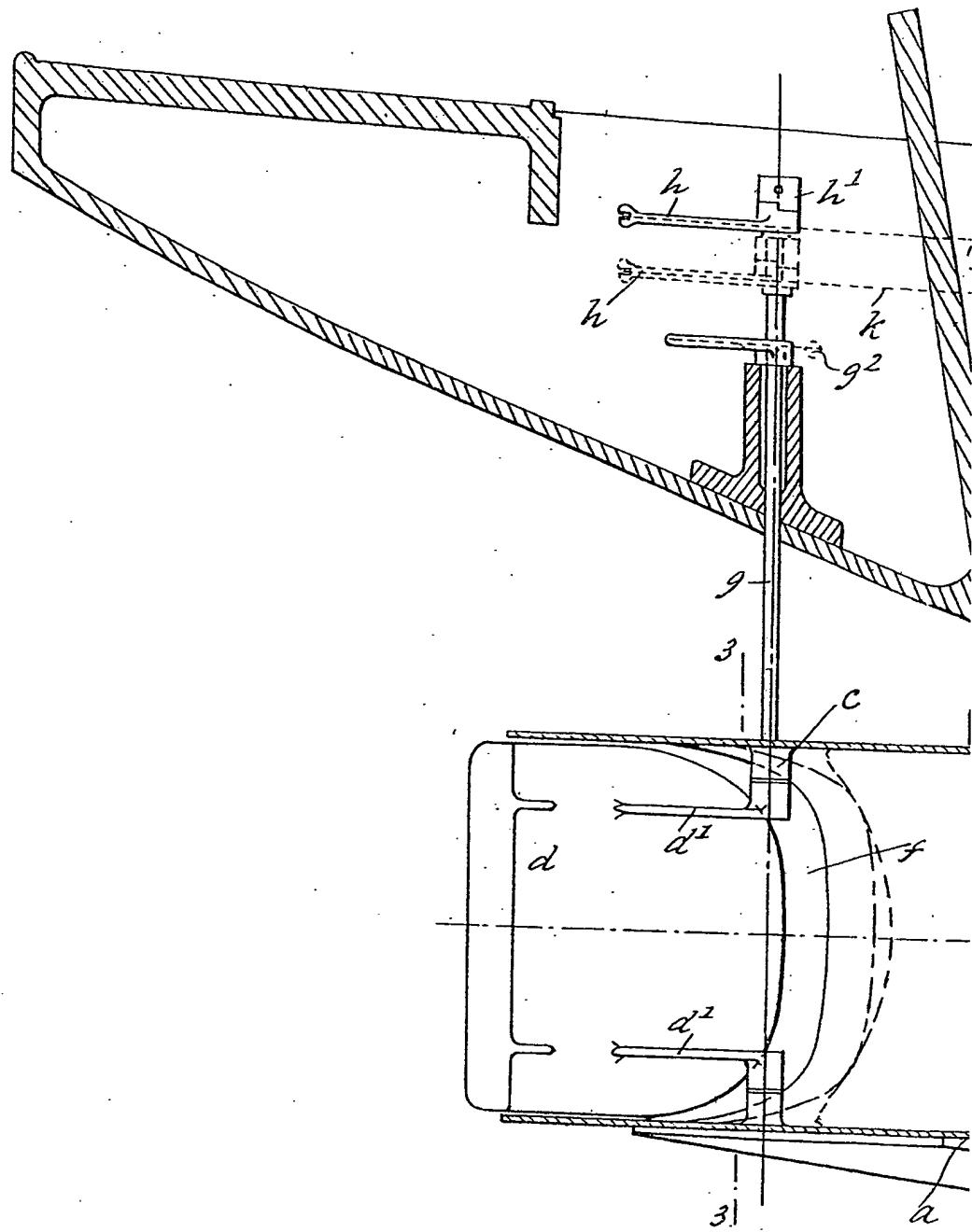
herein described with reference to Figs. 10 1—5, or modified as shewn in Figs. 6—8 of the accompanying drawings.

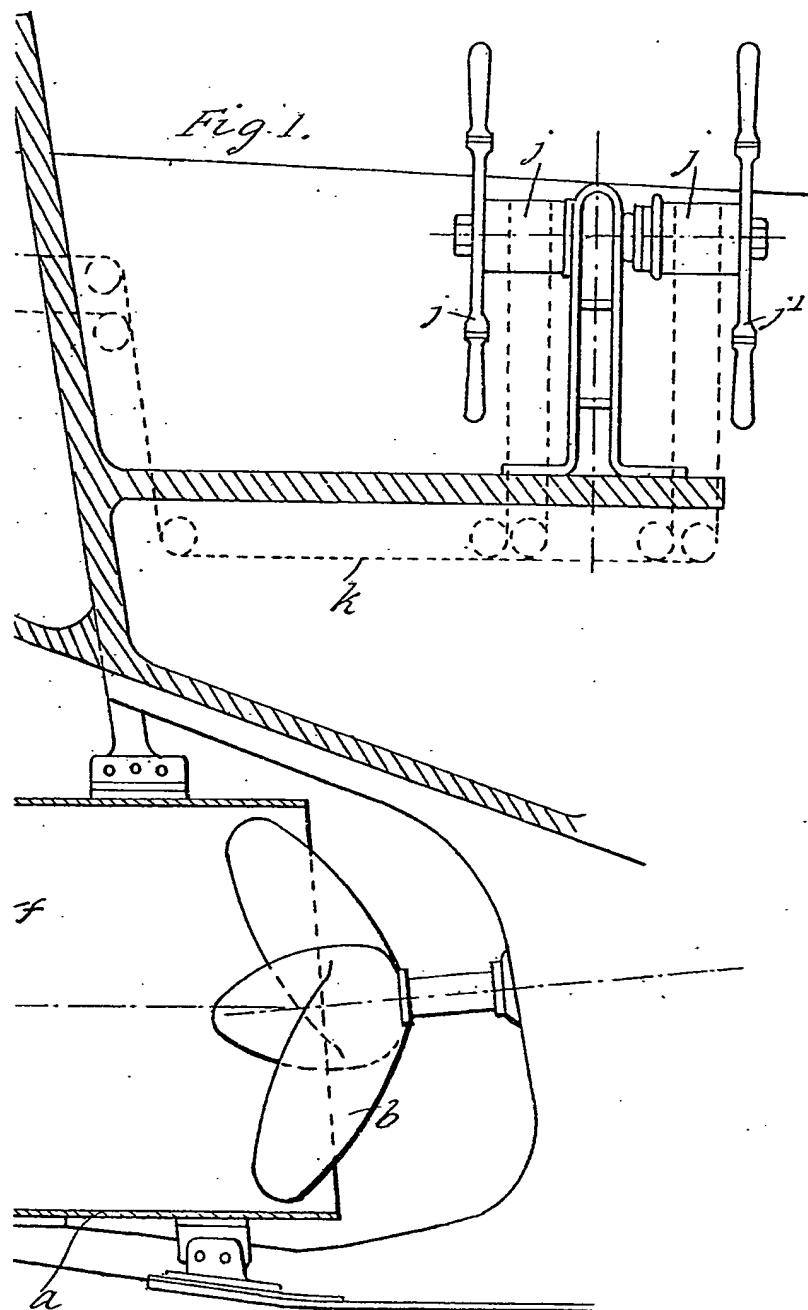
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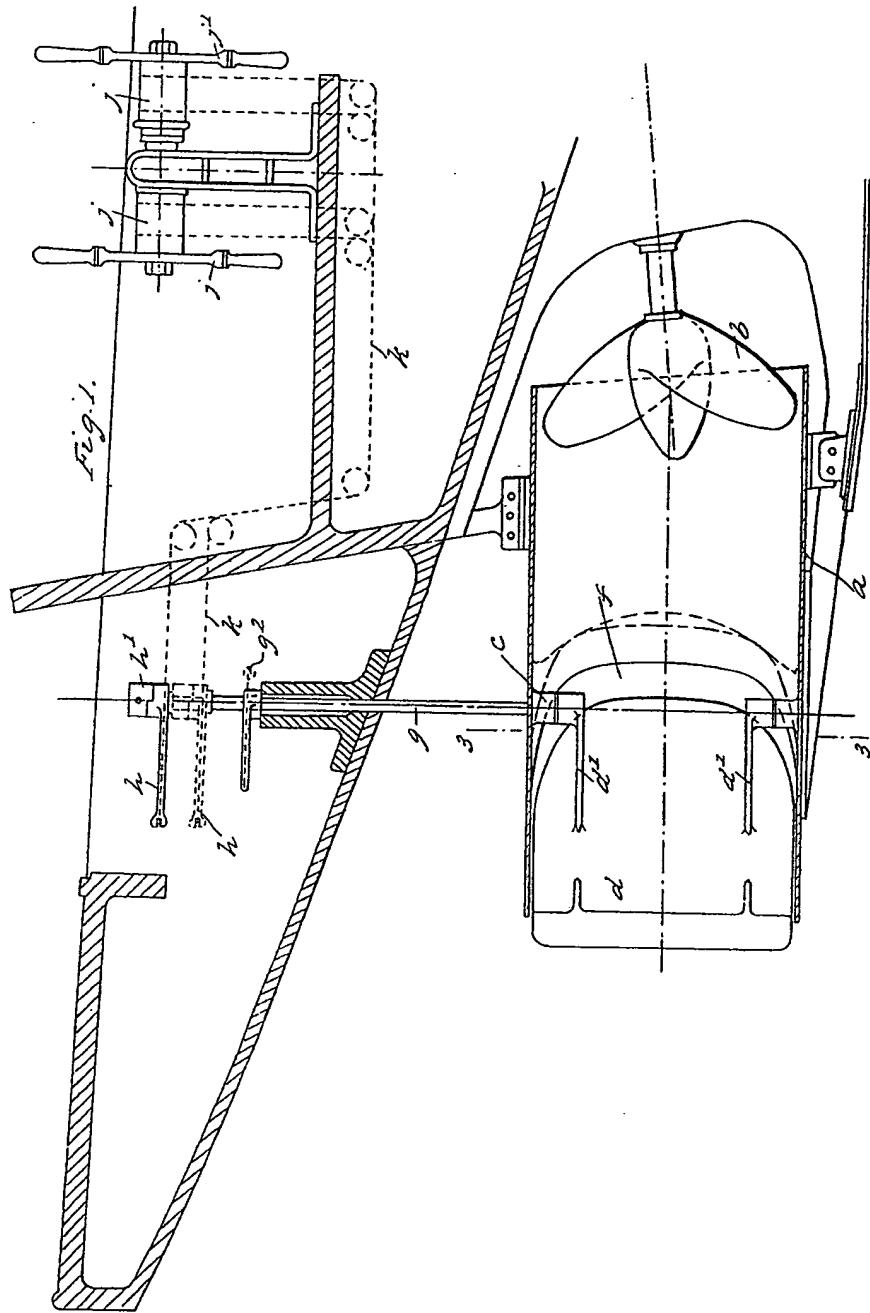
ABEL & IMRAY,
Agents for the Applicant, 15
30, Southampton Buildings, London,
W.C. 2.

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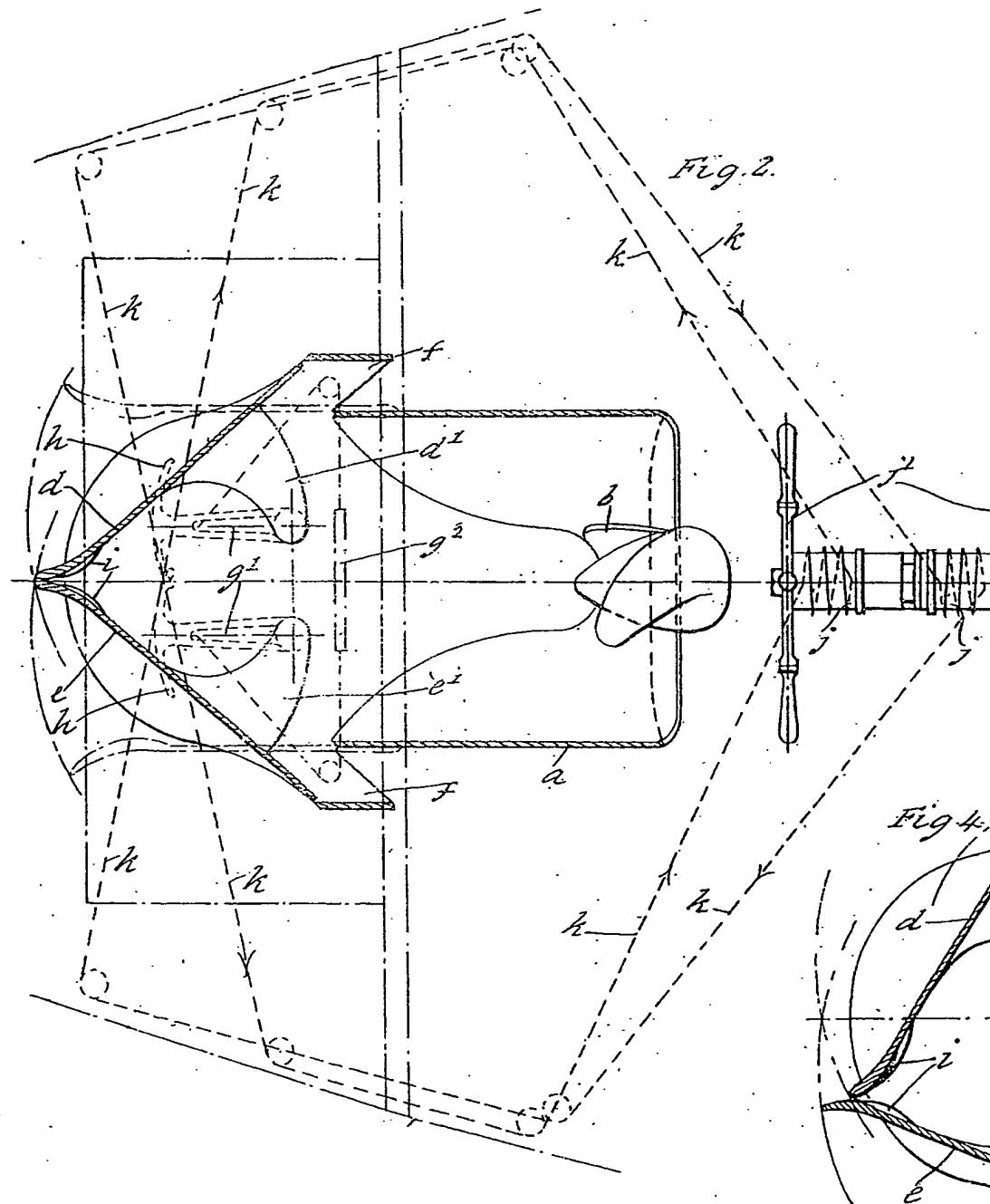
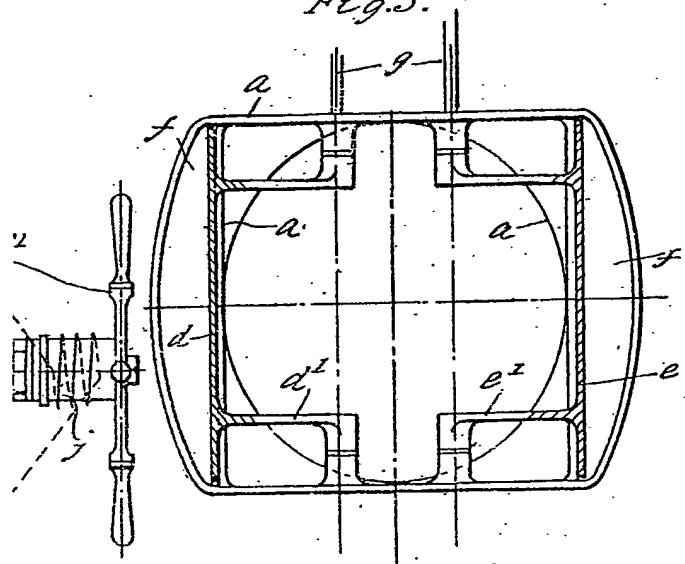
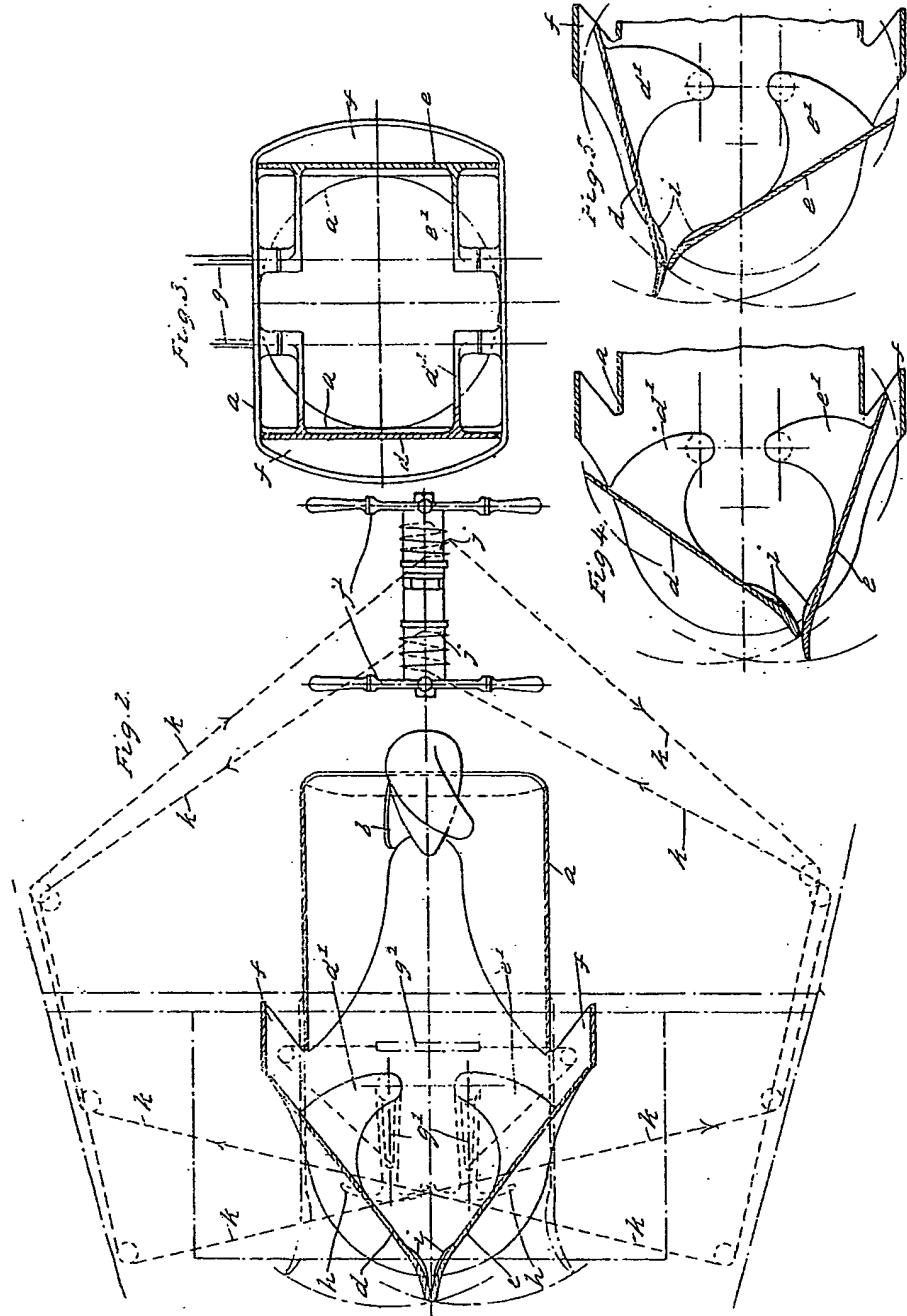


Fig. 3.



Technical drawing of a mechanical part labeled "Fig. 4." showing a cross-section with various features and dimensions. The drawing includes a central vertical line, a horizontal line, and several curved and straight lines forming a complex shape. Labels include "a" at the top right, "d" and "d²" near the top center, "i" and "i²" on the left side, and "e" and "e²" on the right side. The bottom left corner contains the letter "c".



This drawing is a reproduction of the original on a reduced scale.

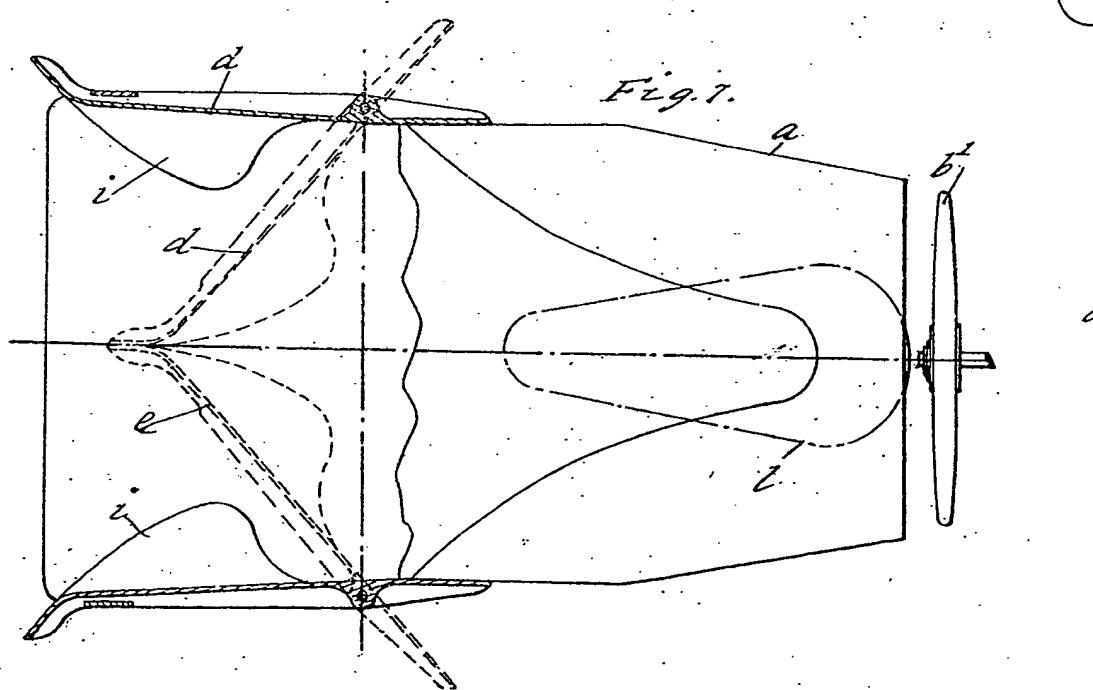
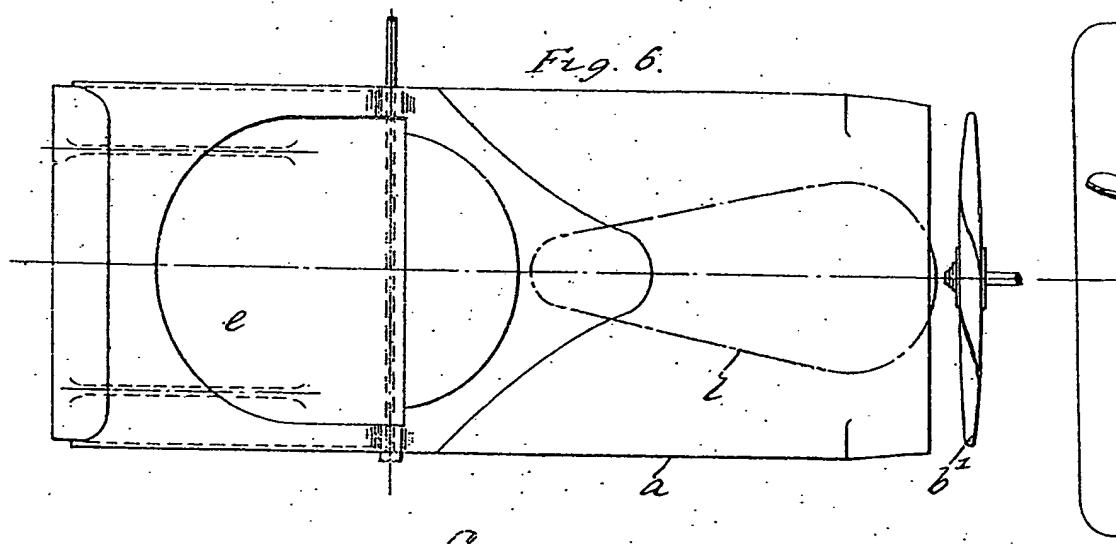


Fig. 7.

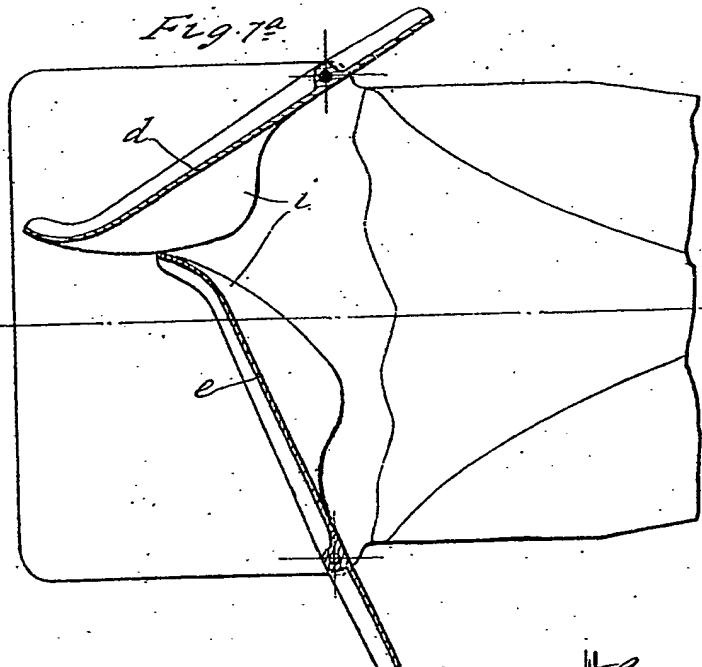
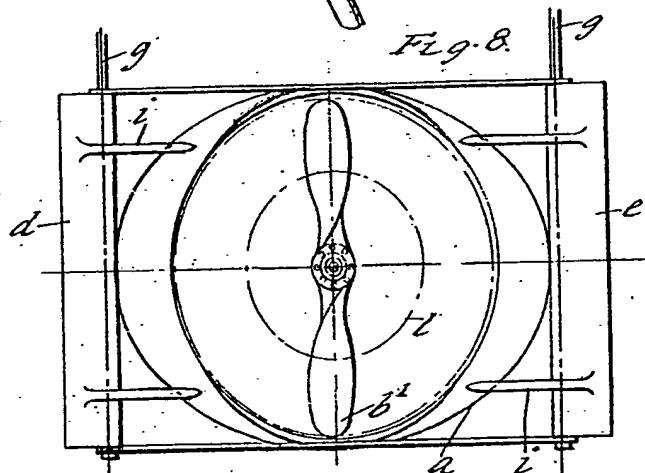


Fig. 8.



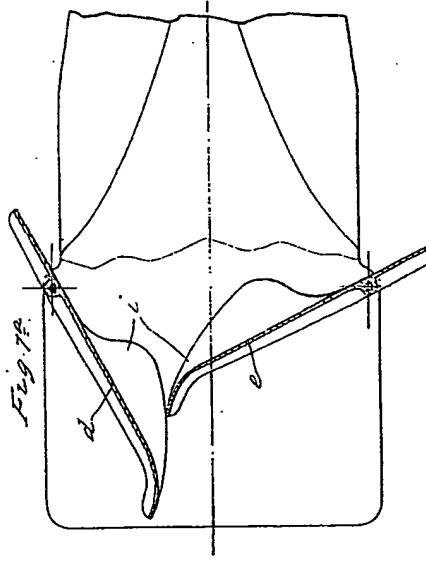


Fig. 1A.

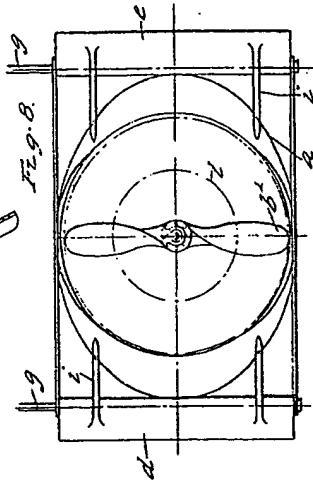


Fig. 2B.

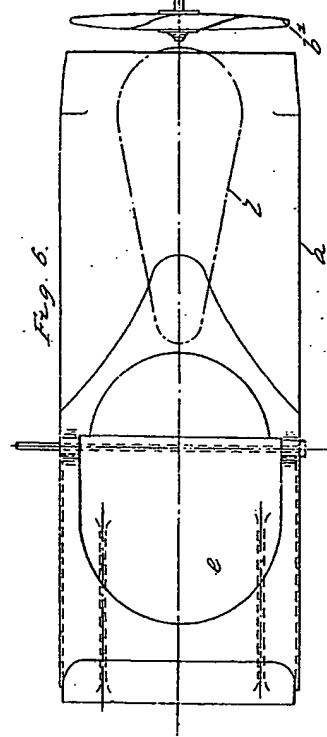


Fig. 6.

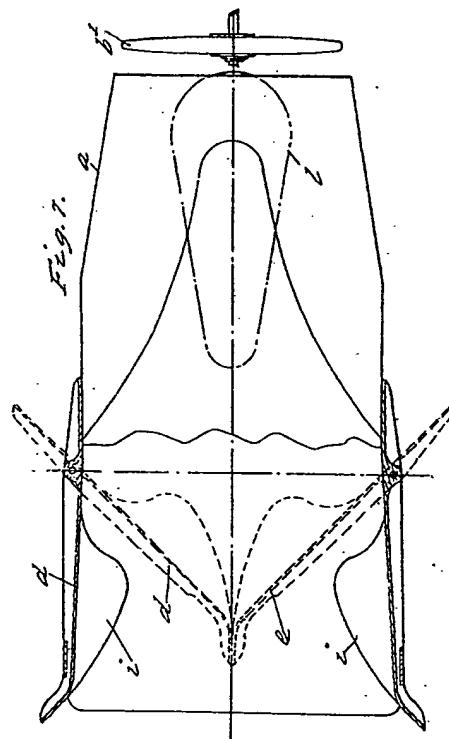


Fig. 7.

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